

Amendment to the Specification

Please amend the first paragraph on page 8 as follows:

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the preferred embodiment and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Such ~~alternations~~ alterations to and further modifications of the invention, and such further applications of the principles of the invention as described herein as would normally occur to one skilled in the art to which the invention pertains, are contemplated, and desired to be protected.

Please amend the first paragraph on page 10 as follows:

It has been determined by the inventors that, in order to operate the QT118H with a sufficiently low power drain to make battery power a viable option, the resistance between the electrode and ground must be at least about $10k\Omega$. Assuming essentially perfect isolation through the solid components of the faucet, this can be accomplished by separating the mechanical valve from the metallic water pipes through a long column of water. The required length of that column is a function of the conductivity of the water, which, it will be appreciated, varies enormously from geographic location to location. It has been determined by the inventors that even with water that is 6 σ above the mean conductivity in the various water supplies throughout the United States, the required $10k\Omega$ of resistance is achieved when the water column is at least 18 inches long, with a circular cross-sectional diameter of $\frac{1}{4}$ inch ~~in diameter~~. Thus, the preferred embodiment faucet according to the present invention includes at least 18 inches of non-conductive piping with a $\frac{1}{4}$ inch ~~internal~~ inner diameter that extends below the mechanical

valve under the sink. The water pipe is connected to the faucet only at the end of that pipe. (It will be appreciated that in many embodiments two such pipes are required—one for the hot water supply and one for the cold.) Preferably, these extensions are included in the form of flexible, non-conductive hoses.

Please amend the first paragraph on page 11 as follows:

Quantum Research Group also provides a variety of other suitable ICs that convert electrodes into touch sensors, including the rest of the QT110 series. It will be appreciated that these ~~IC~~ ICs have varying performance, including variations in the extent to which the electrode must be isolated from ground and the amount of power they draw. Thus, while the preferred embodiment employs the QT118H with an electrode separated from ground by 10k Ω , other suitable configurations are possible, and will be apparent to those skilled in the art. Indeed, other capacitive touch detectors can be used as well. Suitable capacitive touch-detection systems are disclosed, for example, in U.S. Patent No. 6,518,820 to Gremm, and in U.S. Patent No. 5,790,107 to Kasser, et al., which are hereby incorporated herein in their entireties. Electrode design is also discussed in detail in, for example, “Capacitive Sensors, Design and Applications,” by Larry Baxter (IEEE Press).

Please amend the first full paragraph and the second paragraph on page 12 as follows:

The physical mechanism by which the water flow is toggled is not critical, but~~[[,]]~~ a magnetically latching pilot-operated solenoid valve is advantageously used, in part to limit power consumption. Regardless, this valve is preferably relatively slow-opening and -closing, in order to reduce pressure spikes, known as “water hammer,” and undesirable splashing. On the other hand, the valve should not open or close so slowly as to be irritating to the user. It has

been determined that a valve opening or closing period of at least 0.5 second sufficiently suppresses water hammer and splashing.

In the preferred embodiment the touch control in the spout and the touch control in the handle articulate the electrically operable valve via separate logical controls. (Although the logical controls are preferably distinct, they are preferably implemented with a single electric or electronic circuit.) In the preferred embodiment the touch control in the spout is controlled by a logical control that distinguishes between a grasping ~~contact~~ contact, such as occurs when a user touches the spout to reposition it, and a mere tap, which is presumed to be an instruction to toggle water flow.

Please amend the paragraph starting at line 16 of page 14 as follows:

In the preferred embodiment the faucet operates in at least two modes: a manual mode, wherein the electrically operable valve remains open, and a hands-free mode, wherein the electrically operable valve is toggled in response to signals from a proximity sensor. This is described in greater detail in the concurrently filed application entitled "Multi-Mode Hands-Free Automatic Faucet," U.S. Application No. 10/755,581, which is hereby incorporated herein in its entirety. Thus, in the manual mode the faucet is controlled by the position of the handle like a conventional faucet, while in the hands-free mode, the flow is toggled on and off in response to the proximity sensor (while the flow temperature and rate are still controlled by the handle position, as normally). It will be appreciated that the logical control 100 can be used to permit touch-control of the faucet by tapping the spout in either of these two modes.

Please amend the paragraph beginning at line 11 on page 15 to read as follows:

In certain alternative embodiments the logical control is adapted to respond to the duration of contact with the touch control to control the rate of flow, in addition to toggling the water flow on and off. In these embodiments the electrically operable valve is preferably not a magnetically latching valve. Instead, preferably, a valve is used that can be electrically controlled to be placed in range of positions, including an open position, a closed position, and a plurality of partially closed positions. It will be appreciated that the duration of contact with the touch control can be associated with any of a variety of instructions to the electrically operable valve. For example, in certain embodiments, contact of a duration below a given ~~duration~~ threshold (e.g., 50 ms) is ignored, contact of a duration within a relatively short window (e.g., 50-250 ms) is interpreted as an instruction to toggle water flow completely on or off, and contact ~~for~~ of a greater duration is interpreted as a command to gradually decrease (or increase) flow rate as long as the contact is maintained.

Please amend the first paragraph on page 17 as follows:

It will be appreciated that the present invention can be used in conjunction with a hands-free control arrangement that interprets motion of objects, rather than merely their proximity, by employing a position-sensitive device ("PSD") as the proximity detector. A PSD is sensitive to motion of an object within its detection zone because it can sense the distance of an object from the sensor. This is discussed in greater detail in the concurrently filed application entitled "Control Arrangement for an Automatic Residential Faucet," U.S. Application No. 10/755,582, which is hereby incorporated herein in its entirety.